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54) Invention Title	Shoe Sole for Sport Shoes
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21) Utility Model Application No.:	S63-2475
22) Filing Date:	January 12, 1988
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43) Laid Open Date:	November 17, 1989

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Examiner	Misao Taniguchi
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57) What is Claimed in the Utility Model Registration is:

1 A shoe sole for sports shoes, wherein in a certain part of a shoe heel, a sheet made of a desired material is embedded, and one or more holes with a desired shape are provided, enabling the embedded sheet to be seen through a ground-contacting surface of said part with the embedded sheet.

2 The shoe sole for sports shoes according to Claim 1 of the Utility Model Registration Application, wherein said sheet possesses a corrugated part(s).

3 The shoe sole for sports shoes according to Claim 1 of the Utility Model Registration Application, wherein said sheet is a fiber-reinforced plastic sheet.

4 The shoe sole for sports shoes according to Claim 1 of the Utility Model Registration Application, wherein said sheet is made by combining a fiber-reinforced plastic sheet and another desired material(s) such as a fabric, woven material and the like.

5 The shoe sole for sports shoes according to Claim 1 of the Utility Model Registration Application, wherein said sheet possesses an even thickness.

6 The shoe sole for sports shoes according to Claim 1 of the Utility Model Registration Application, wherein said sheet possesses different thicknesses.

#### Detailed Explanation of the Invention

##### (Field of Industrial Application)

The present invention pertains to a shoe sole for sports shoes suitable for training, jogging, marathons and so forth.

##### (Conventional Technologies)

In training, jogging, marathons and so forth, after repeated long-hour runs, landing shocks are transmitted to one's head through the legs, knees and upper body. On paved roads, the landing shocks are stronger and wearing sports shoes with poorly cushioned shoe soles may cause an inflammation on the soles of feet, or an injury to the legs, knees, lower back and so forth, and may increase fatigue.

Therefore, conventionally, using cushioning materials such as sponge in shoe soles to give them cushions has been a common practice. However, there are disadvantages in that thick cushioning materials make shoe soles so soft that they become easy to deform upon landing, which may cause ankle injuries, and that the thick cushioning materials also weaken kicking force and decrease running speed.

Consequently, as is disclosed in Utility Model Application Publication No.S61-6804, a shoe sole for sports shoes in which a sheet consisting of a woven material and so forth in a corrugated form is embedded only in a heel part of a mid sole formed with a foam material, with an outsole bonded on the underside, has been proposed.

##### (Issues to be Resolved by the Invention)

The shoe sole in the aforementioned Utility Model Application Publication No.S61-6804 has a sheet in a corrugated form embedded in the heel part made of a foam material, and therefore, there are advantages in that compressive deformations of the heel part are reduced, and the compressive resistance

can be controlled by changing the width and height of the corrugation of the sheet, thereby providing a different degree of cushioning, and reducing landing shocks. Thus, inflammations on the soles of feet and disorders to legs can be prevented. However, there are disadvantages in that the embedded sheet can not be seen from the outside, and therefore, the shoes can not be purchased after visually recognizing the width and height of the corrugation of a sheet, and that the sole becomes heavier by the weight of the embedded sheet.

(Means to Resolve the Issues)

(2)

Thus, the present invention aims to take advantage of such a sole with an embedded sheet and enable a visual recognition of conditions of the embedded sheet, while reducing a weight increase due to the embedded sheet as much as possible.

In other words, the present invention provides a sole for sports shoes, wherein in a certain part of a shoe heel, a sheet made of a desired material is embedded, and one or more holes with a desired shape are provided, enabling the embedded sheet to be seen through a ground-contacting surface of said part with an embedded sheet.

Flat parts and corrugated parts are desirably formed on said sheet. Moreover, the sheet may possess an even thickness or different thicknesses.

(Operations)

An embedded sheet in a shoe sole has effects to limit twisting and bending of the shoe sole and excessive deformations of the shoe sole are reduced when the shoe sole lands on the ground while running. The shoe sole absorbs and eases the landing shock and at the same time the shoe sole enhances the elastic reaction and improves the stability of running.

Especially, besides the fact that the material and form of the embedded sheet can be visually confirmed through the holes provided on the ground-contacting surface, the shoe sole can alter its flexibility depending on the position, form and number of holes.

(Embodiments)

Figures 1 (a) and (b) illustrate Shoe Sole 1 in which Sheet 2 made of a desired material is embedded (extending from the arch part to the heel part) and which is provided with Hole 5 with a desired shape to such a depth that said sheet can be seen through Ground-Contacting Surface 4 under a part of Heel Part 3 out of the part in which said sheet is embedded.

An embodiment illustrated in Figures 2 (a) and (b) depicts Shoe Sole 1 in which corrugated Sheet 2 made of a desired material is embedded (extending from the arch part to the heel part) and which is provided with Hole 5 with a desired shape to such a depth that said sheet can be seen through Ground-Contacting Surface 4 under a part extending from Arch Part A to Heel Part 3 out of the part in which said sheet is embedded.

An embodiment illustrated in Figures 3 (a) and (b) depicts Shoe Sole 1 in which corrugated Sheet 2 made of a desired material comprising Flat Part B and Corrugated Part C is embedded (extending from the arch part to the heel part) and which is provided with Hole 5 with a desired shape through Ground-Contacting Surface 4 under a part of Arch Part A out of the part in which said sheet is embedded to a depth reaching said sheet.

An embodiment illustrated in Figures 4 (a) and (b) depicts a shoe sole which is the same as that depicted in the embodiment of Figures 3 (a) and (b), except that another Hole 5 with a desired shape is provided through Ground-Contacting Surface 4 under a part of Heel Part 3 to a depth reaching said sheet. An embodiment illustrated in Figure 5 depicts the same shoe sole except that a plurality of Holes 5 with a desired shape are provided through Ground-Contacting Surface 4 under a part extending from Arch Part A to Heel Part 3 to a depth reaching said sheet.

Figures 6 (a), (b), (c) and (d) illustrate an embodiment depicting an example of manufacturing processes. Sheet 2 is made of a fiber-reinforced plastic and comprises Flat Part B and Corrugated Part C. Sheet 2 is embedded in Heel Part 3 of Mid-Sole D. Wedge E is stacked and bonded thereupon. Mid-Sole D is provided with Hole 5 exposing said sheet underneath embedded Sheet 2. Outsole F provided with Hole 5' matching Hole 5 is bonded so that Holes 5 and Hole 5' coincide with each other. Thus, the shoe sole enables Sheet 2 to be seen through Ground-Contacting Surface 4.

In addition, though figures are omitted, combinations of aforementioned embodiments are unconstrained, and the color and thickness of Sheet 2 can be made even or different from over the sheet.

Furthermore, for a fiber-reinforced plastic to be employed in the present invention, a thermosetting synthetic resin or a thermoplastic synthetic resin can be utilized as a matrix resin. Moreover, carbon fibers, glass fibers, aramide fibers or other fibers can be employed for fiber reinforcement. Further, by properly selecting a thermoplastic synthetic resin as a matrix resin among a polyamide resin, a polyurethane resin, an ionomer resin and other resins, and by properly selecting a fabric, a mat, parallel-aligned fibers and the like made of carbon fibers, aramide fibers, glass fibers or other fibers for fiber reinforcement, a better shoe sole for sports shoes can be produced.

#### (Advantages of the Invention)

In the present invention, Sheet 2 made of a desired material is embedded in a desired part of Shoe Sole 1. Therefore, the present invention has advantages in that with changes in materials of said Sheet 2 and in the corrugated form, a shoe sole with different properties in its flexibility, ease of twist, elasticity and so forth can be designed.

Moreover, when Sheet 2 is embedded closer to the upper surface of a shoe sole, the landing cushion becomes softer. Conversely when Sheet 2 is embedded closer to the bottom of a shoe sole, the landing cushion becomes relatively harder while enhancing the kicking force and running becomes more stable.

The present invention is characterized in that consumers can visually recognize the advantages of having such an embedded sheet and its quality. That is to say that one or more Holes 5 with a desired shape through which an embedded sheet can be seen from the side of Ground-Contacting Surface 4 where

(3)

Sheet 2 is embedded are provided. Therefore, looking through Holes 5, the material, shape and the like of embedded Sheet 2 can be easily recognized. Then the flexibility, ease of twisting and elasticity and so forth can be checked by touching the shoes in order to ensure a selection of shoes with a shoe sole that is best suited to one's preference and purpose.

In addition, it can be recognized that a shoe sole is light-weighted in accordance with the shape, size and number of Holes 5 and at the same time, Holes 5 allow the cushioning effects to be recognized. These are beneficial to consumers.

(Brief Explanation of Figures)

Figures illustrate embodiments. Figures 1 (a), 2 (a), 3 (a), 4 (a), and 5 (a) are cross sections to explain the embodiments. Figures 1 (b), 2 (b), 3 (b), 4 (b) and 5 (b) are bottom views to explain the embodiments as each shoe sole is viewed from its ground-contacting surface. Figures 6 (a), (b), (c), and (d) illustrate an example of manufacturing processes, and are angled views to explain the processes as Components (a), (b), (c) and (d) are sequentially bonded along the direction of Arrow G.

1 --- Shoe Sole,	2 --- Sheet made of a desired material,	3 --- Heel Part,
4 --- Ground-Contacting Surface,	5 and 5' --- Hole,	A --- Arch Part
B --- Flat Part,	C --- Corrugated Part,	D --- Mid-Sole,
E --- Wedge,	F --- Outsole,	G --- Bonding

Figure 1

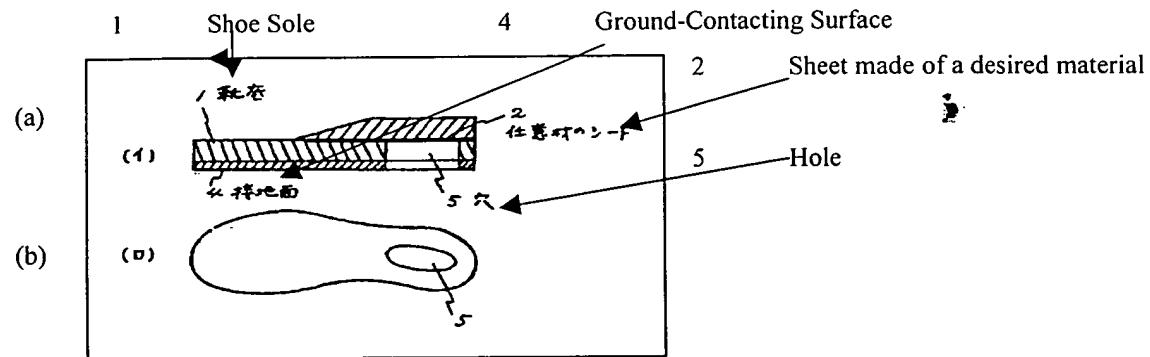


Figure 2

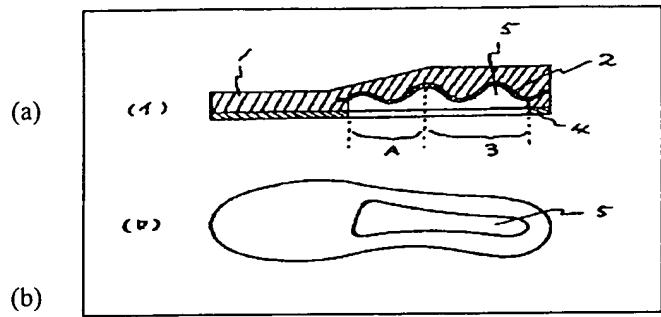


Figure 3

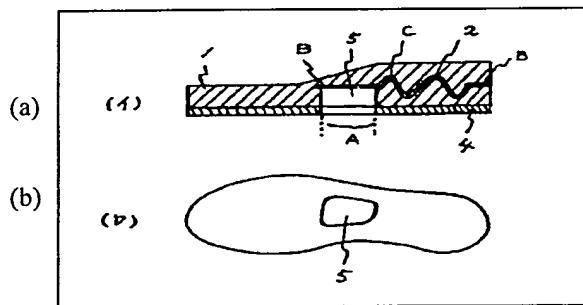
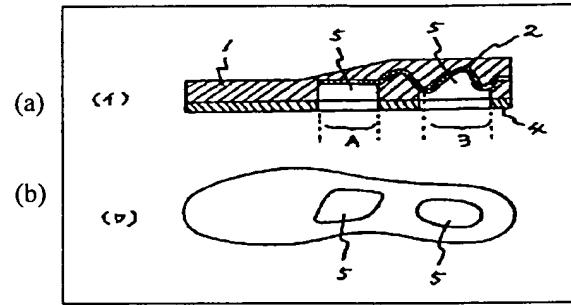


Figure 4



(4)

Figure 5

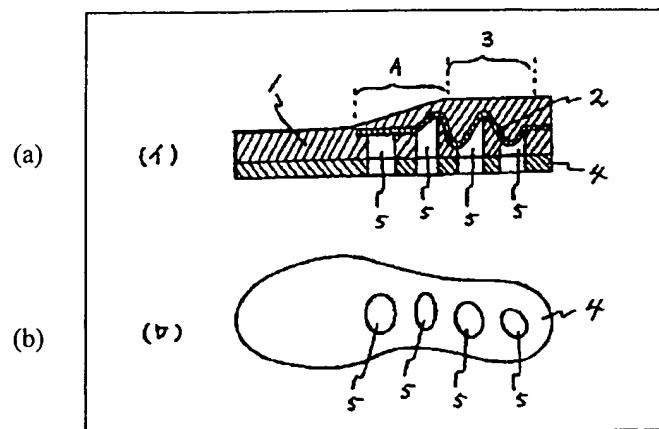
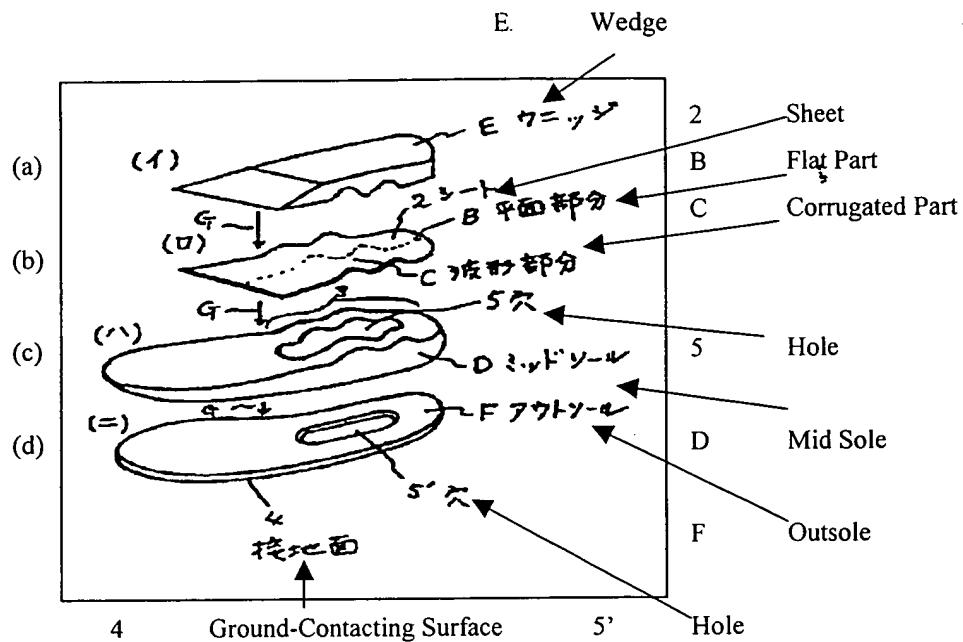


Figure 6



[Publication Type] Utility Model Law [Before the revision by Heisei 5 the 26<sup>th</sup> Law] The amendment by the provision in the Article 64 of the Patent Law called out in its Article 13.

[Category Division] The second division of the first category

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[Utility Model Registration Number] 2128563

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5/06 9446-4F

[Amendments]

1. The items in "What is Claimed in the Utility Model Registration is" are to be amended to:

"1 A shoe sole for sports shoes, wherein in a certain part of a shoe heel, a sheet having a corrugated part and made of a desired material is embedded, and one or more holes with a desired shape are provided, enabling the embedded sheet to be seen through a ground-contacting surface of said part with the embedded sheet.

"2 The shoe sole for sports shoes according to Claim 1 of the Utility Model Registration Application, wherein said sheet is a fiber-reinforced plastic sheet.

"3 The shoe sole for sports shoes according to Claim 1 of the Utility Model Registration Application, wherein said sheet is made by combining a fiber-reinforced plastic sheet and another desired material(s) such as a fabric, woven material and the like.

"4 The shoe sole for sports shoes according to Claim 1 of the Utility Model Registration Application, wherein said sheet possesses an even thickness.

“5 The shoe sole for sports shoes according to Claim 1 of the Utility Model Registration Application, wherein said sheet possesses different thicknesses.

2. On the 1<sup>st</sup> line on Page (2), “embedded sheet” is to be amended to “embedded corrugated sheet.”

3.

3. On the 5<sup>th</sup> line on Page (2), “a sheet made of a desired material is embedded“ is to be amended to “a sheet having a corrugated part and made of a desired material is embedded.”

4. On the 12<sup>th</sup> line on Page (2), “An embedded sheet” is to be amended to “An embedded sheet having a corrugated part”.

5. On the 58<sup>th</sup> line on Page (2), “Sheet 2 made of a desired material is embedded” is to be amended to “Sheet 2 having a corrugated part and made of a desired material is embedded.”

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